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ABSTRACT

This handbook was written for use with the Argonne National Laboratory's electronic bulletin board system (BBS) called NEWTON, which is designed to create an electronic network that will link scientists, teachers, and students with the many diversified resources of the Argonne National Laboratory. The link to Argonne will include such resources as scientists, research programs, and educational programs (workshops, conferences, and instructional materials), and serve as a forum for sharing knowledge, new ideas, and teaching materials. Through the BBS, students will be able to interact with fellow students throughout the nation, and the BBS will help to build a teacher support group that will work with established teacher-alliance networks and worldwide research networks, including Internet. This manual begins with the mission statement which identifies objectives, primary users, materials, and services of NEWTON. The introduction then examines telecommunications and education and the NEWTON BBS. Additional sections contain information on accessing NEWTON; equipment needed to login to NEWTON; the setup of the equipment; the login procedure; and a list of NEWTON's features including system, personal, and group features. Appendices contain information on: (1) hardware/software purchasing; (2) other educational BBS's and services; and (3) basic commands for Hayes modems. A glossary of terms is also provided. (JLB)

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Telecommunications Handbook

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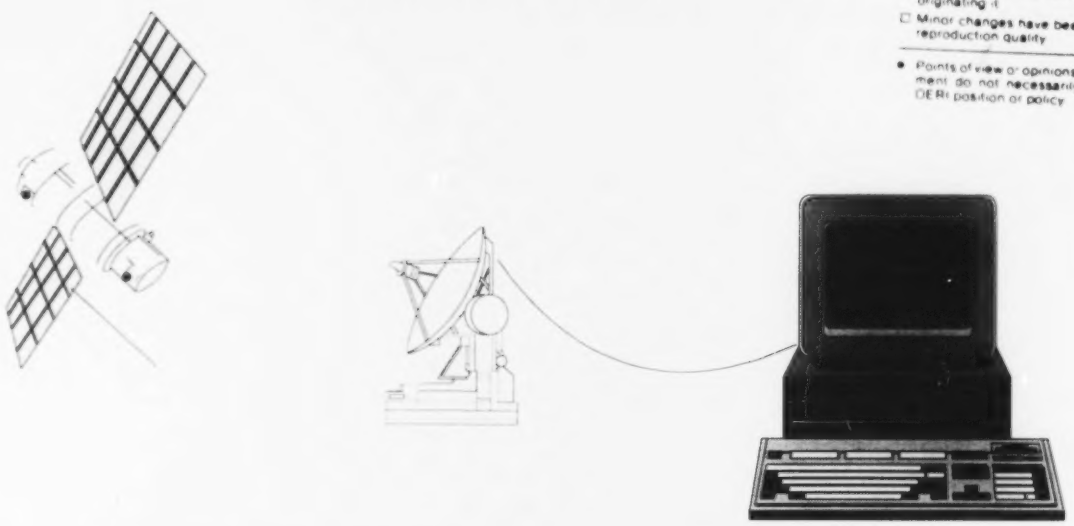

Connecting to NEWTON

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Linking Research and Education

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Division of Educational Programs

Dear Reader,

This handbook was written for use with Argonne's electronic bulletin board system (BBS) called "NEWTON." NEWTON is an educational bbs for use by teachers, students, and parents. Topics on NEWTON range from discussions on science fair topics to online question and answer sessions with scientists. Future capabilities will include the extension of some of Internet's services. (Internet is collection of thousands of computers connected together worldwide with features like e-mail, UseNet news, telnet, and file transfer protocol - ftp).

The purpose of NEWTON is to break the boundary of local classroom and to connect teachers and students worldwide. Even though NEWTON is located at Argonne National Laboratory in Illinois, it has two dial-in phone lines and is also connected to the Department of Energy's (DOE) Energy Science Network (ESNet). Since ESNet is part of the Internet system, access to NEWTON can be obtained worldwide. This "people network" or "global classroom" is available to anyone with a computer, telephone line, and a modem or a computer and/or account on a computer located anywhere on Internet.

In order to make connecting to NEWTON as easy as possible, this manual was written to help assist the first time user. For those experienced users, advanced features are also explored. Since this is an educational venture, please feel free to copy any portion this manual and/or distribute to others. We are always looking for more members to the NEWTON family and encourage you to tell a friend or colleague.

Christopher Baker
Newton's System Operator (sysop)

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MISSION STATEMENT OF ARGONNE'S EDUCATIONAL ELECTRONIC BULLETIN BOARD - NEWTON

Objectives:

The objective of Argonne's electronic bulletin board system (BBS), called NEWTON, is to create an electronic network that will link scientists, teachers, and students with the rich and diversified resources of Argonne National Laboratory. The link to Argonne will include resources such as scientists, research programs, and educational programs (workshops, conferences, and instructional materials). The BBS will be a forum for sharing knowledge, new ideas, and teaching materials, particularly spin-off materials developed through educational experiences at Argonne. Through the BBS, students will be able to interact with fellow students throughout the nation. The BBS will help build a teacher support group that will work with established teacher-alliance networks (e.g., NSTA, ISTA, ACT, etc.) and worldwide research networks (e.g., Usenet News, Internet, and KidsSphere).

Primary Users:

1. Teachers (college/university, high school, K-8),
2. Students (college/university, high school, K-8),
3. Scientists from the Department of Energy (DOE) laboratories,
4. Scientists from industry,
5. Personnel of Argonne's Division of Educational Programs (DEP), and
6. Argonne Community of Teachers (ACT).

Materials:

- Telecommunications users handbook
- Telecommunications workshops and classes

Services:

Discussions on
- Teacher 'Networks'
- Teaching Topics
- Argonne Program Information
- ACT
- ACT Newsletter
- Outreach / Professional Growth Opportunities
- Other Teacher Special Interest Groups
- Hobbies

Other Services
- Ask a Scientist a Question
- Internet Services - 'Portaling'
- E-mail (local and worldwide Internet)
- On-Line Chatting
- On-Line Meetings
- File Exchange
- Calendar of Events
- Resources (i.e., Lesson Plans, Experiments, Overheads, etc.)

INTRODUCTION

Telecommunications and Education

"See you on-line" is a phrase you hear more often these days as teachers part after workshops and institutes. "On-line" refers to telecommunications, the fastest-growing educational technology in the 1990s. With a computer and a modem, the physical boundaries of the classroom, school, and district disappear.

For you, the science teacher, telecommunications gives a new meaning to networking. The computer will allow you to communicate with colleagues across the nation and around the world. By using a computer bulletin board system (BBS), you can explore new teaching ideas, focus on specific interest areas, exchange lesson plans, download science software, search databases, exchange e-mail, take classes, and actively participate in distant interactive learning.

Telecommunications also opens up the electronic world to your students. They will be able to gather data from electronic libraries 24 hours a day, exchange e-mail with fellow students, ask scientists questions, become part of a nationwide team doing science research projects, and even get expert help with homework! Almost all of these opportunities are (or will soon be) offered by Argonne's educational BBS, NEWTON. NEWTON is a great place to get started with on-line telecommunications.

The NEWTON BBS

The NEWTON project grew out of an earlier initiative, The Argonne Community of Teachers Network (ACT), whose goal was to link teachers who had come to Argonne for workshops or summer programs with Argonne resources. The design of NEWTON arose from this group process in collaboration with DEP technical staff. The project was then opened to all interested teachers, students, scientists, and a few parents.

Teachers have guided the direction and scope of NEWTON since its inception. NEWTON's operations staff and teacher advisory group volunteer considerable effort to the design and daily operation of the system. The biggest effort by these volunteers or 'moderators,' is performing 'house keeping' and 'decision-making' activities on the system. This authority-sharing is very important in NEWTON's performance and success.

Removing teacher isolation and encouraging all levels of communication and collaboration, i.e., "networking", is a fundamental starting (and ending) point of this project. This basic service allows the system to be dynamic and self-priming. Using NEWTON email, chat, public discussions, etc., can expand your knowledge and skills with each online session - the system teaches you how to use the technology. The sky is the limit!

GETTING TO NEWTON

How to Access NEWTON

NEWTON can be accessed in two different ways (network or dial-up) in two different modes (text or graphics). The difference between the different modes are as follows:

Text Mode: This method is available through any standard communication package (e.g., Kermit - free/public domain, ProComm+, Bitcom, RedRider - MAC, VersaTerm Pro - MAC) using a straight text connection. All features--except the more than two users on-line chatting (called "meetings")--available through the graphics mode (below) are accessible with this method. The only difference is that everything is done using straight black-and-white text. To use text mode, login as "bbs".

Graphics Mode: This method is one of the main advantages of the Argonne BBS. The BBS has an access program (communication package) designed to run on an IBM PC (Mac version, scheduled for release in 1994). Using this access program, a user can dial the modem, connect, and login to the BBS. Once the systems connect, all the functions of BBS are performed graphically. Color menus, full-screen bit-mapped pictures, and many other features are available. The access program will also work with a mouse. The BBS host and remote access program act as a client-server model, sharing tasks. (NOTE: The access program can be distributed freely at no charge and is available for down-loading from NEWTON under the group file exchange area.) To use graphics mode (using the access program), login as "coconet".

How to Get to NEWTON

Getting to NEWTON is also flexible. Connecting is currently achieved either through a single telephone number or via Internet.

Dial-Up: Dial-up access is via a single telephone number 708-252-8241, 300-19200 baud at N81.

Network: The second way to access the system is via a network. NEWTON is connected to Argonne's wide-area network (WAN) which is connected to Internet (a collection of many WANs, including ESNet, Bitnet, and NSFnet). Any person on Internet can access the BBS using TCP/IP's remote login capability (called telnet). Many public-domain version is available for both Mac and IBM computers. One such package is from the National Center for Supercomputer Applications (NCSA) and is available via anonymous FTP from most large FTP sites. Running this software from a networked workstation, a user can remotely login to NEWTON using the text (login as "bbs") mode. The address for the BBS is "newton.dep.anl.gov".

NOTE: Network access with graphics mode (login as "coconet") is currently possible only if you are using the access program to dial into an Internet node (terminal server, another Internet machine, etc.) and then telneting to NEWTON. A network version of the access program that uses TCP/IP and runs under Microsoft Windows on the IBM is scheduled for release in 1994.

EQUIPMENT

Dial-up:

What will be needed to login to Argonne's NEWTON? To telecommunicate, you will need a phone line modem, communications software, and computer.

First, a phone line. A standard phone line is required, preferably a single line because modem signals don't always find their way through multiphone networks (e.g., phones with switchboards).

Second, a modem, Hayes compatible, at least 2400 baud and preferably 9600 baud. The modem is the piece of equipment that enables the computer to send data over the phone line. The modem transforms digital computer data to analog data that our current phonelines carry. At the other end the receiving modem changes the analog signals back to digital for the host computer. The process is called MOdulation and DEModulation, thus MODEM. This piece of equipment is relatively inexpensive; prices can range from $30 to $200. A cable to connect the modem to the computer may also be required.

Third, the communications software program to control the hardware and telecommunications process will be required. The communications software may come bundled with the modem, or it can be purchased separately. The software is machine specific (that is, purchased to run on a particular type of computer) but will provide universal translation to other computers. If it must be purchased separately, costs range from $1 to $150.

Fourth, the most important part, a computer. The type of computer is not vital to the process because the data exchange can occur between any two computers. This is because data is stored on computers in the form of a series of bits. The modem and emulation (or communication) software act together to form a universal translator. By emulating a particular terminal type (ASCII, DEC VT100, etc.), the local computer will know how to interpret and understand the host's (remote or other computer) method of sending and receiving these bits.

If help is needed with the modem selection or telecom configuration, contact the district computer specialist (refer to the section "Setup" or to Appendix A, "Hardware/Software Purchase," in this handbook).

Network:

The range of software, machines, and of network arrangements makes it too difficult to explain the equipment necessary for this type of connection in a few pages. The best approach here is to contact your local network specialist, asking him or her how to obtain and install a 'telnet' program on your machine.

SETUP

After purchasing a modem, cable, and software (for help see Appendix A, "Hardware / Software Purchasing"), you need to configure the system. For specific help, refer to the manuals that come with your computer, modem, and software, or contact a local specialist.

The major steps in setting the system are (1) configuring the modem, (2) installing/connecting the modem to the computer and phone, (3) installing the software, and (4) configuring the software for the modem settings.

Configuring the Modem

Internal: Internal modems usually have some jumpers that must be set. These jumpers tell the modem how to communicate with the computer. Usually, only the communication (COM) port selection and interrupt (or IRQ) need checking. These settings must not conflict with other devices in the computer. Refer to appropriate manuals for the settings of other devices. Be sure to record all settings for future reference and setting up the modem software.

External: Many older external modems have dip (small toggle) switches that set the way a modem operates. Newer modems use software controls rather than switches. If the modem has dip switches, they will usually be located on the bottom of the modem or behind the front plastic plate. To remove the plate, press in on the sides of the plastic front and pull out. Some standards settings are (command/dip switch/Hayes software command): Auto-Answer/off/none, Send Result Codes/on/Q0, Command mode Echo to terminal/on/E1, Result Codes in English/on/V1, Extended Result Codes with Dial Tone & Busy/on/X4, DCD (data carrier detect) Active During Connect/on/&C1, and DTR (data terminal ready) disconnects modem/on/&D2. For hardware settings, set the dip switches accordingly. For newer modems, the settings will be placed in software's "Setup/Initialization String" (i.e., ATQ0E1V1X4&C1&D2). Some software packages may require different settings, but these are the most common. For more information on Hayes commands, see Appendix D, "Basic Hayes Commands."

Connecting the Modem to the Computer and Phone

Internal: When installing an internal component, make sure to ground yourself and the component before proceeding. Specifically, keep the three-wire power cord connected to the computer and plugged into the wall's three-prong receptacle. Then, when installing the part, make sure to touch the frame of the computer while installing the part. Also, never touch any connections or components on the card. And, ALWAYS hold the component by its edges. In some computers (usually Apples) the software will need to know into which slot the modem was installed, so write this down.

External: Using the correct cable, connect the appropriate end to the modem (make sure it is off). Then, with both the modem and computer off, connect the other end to the computer. Note which

serial port it is connected to, because the software will need to know this setting. On an IBM compatible the port is usually COM1 but could be COM2 if there are two serial connectors.

Phone: Some modems have two phone connectors (RJ11). One is for the line coming from the wall (Line), and the other allows for a phone to be plugged into the modem (Phone). On some modems, which cord is connected to which connector does not matter, while on other modems it does. Check the manual to ensure the proper connection.

Installing the Software

Many software packages have automatic software installation to hard drives. Some also automatically configure the modem for the particular modem being used. If your package has automatic configuration, refer to the next section before proceeding.

Configuring the Software for the Modem Settings

The software must be able to communicate with the modem. In order to do this, the software must know how the modem was connected to the computer. Therefore, the software must know to which com port or slot (on some Apples) the modem is connected. This is usually set in a modem configuration screen or while installing the software.

The next step is to set the modem initialization string (sometimes called the setup string). This is a series of Hayes AT commands. If the modem being used is external and does not have dip switches, the commands for modem configuration are put here. If there are no special conditions, the set-up program will usually take care of this. There are some user-configurable items that can be modified here, for example, the volume of the modem's speaker. (See Appendix D, "Basic Hayes Commands," for more information.)

Each time a call is placed, there are parameters that are specific for the site being called. These parameters are called the protocol and include baud rate, number of data bits, parity, and number of stop bits. These will be given by a site along with the telephone number, for example, 708-252-8241 at 2400:8N1 (2400 baud, 8 data bits, no parity, with 1 stop bit). For information on each parameter, see the Glossary.

Other configurable parameters include the telephone number to be dialed, default file transfer protocol, and terminal emulation type. The software will usually have an auto-dial sequence for each site that is called. This sequence will usually contain all these site-specific parameters, so when the connection is established, the communication is correct and no other configuration is required.

NEWTON ACCESS SOFTWARE

This software allows the user to access the BBS in a graphical format. It requires that your system have a mouse, a hard drive, and a VGA monitor.

Loading the Software:

1. This program requires 1MB of space on your hard disk. Do a 'dir' command to see how much room is available on your hard disk. The program also requires 515K of base memory to run. Run 'mem /c' to see how much free RAM (the 'largest executable program') you have. If there is not 515K, create a separate boot disk and boot 'stand alone', not loading any drivers you might have for a network, sound card, Windows, etc.

2. To install, copy the program "access.exe" to a separate directory titled "cocodir" on the disk you wish to run on. Then run access by typing "access<return>". This is a self extracting zip file. This creates the files necessary to run the access program. You no longer need this file. You can delete "access.exe".

3. Be sure your modem is connected properly: Phone line in, modem cable connected to the computer serial port, and be sure the modem power supply is plugged in. Turn on the modem.

4. To start the access program, type "coconet<return>". (NOTE: If you have a mouse and would like to use it, make sure the mouse driver is installed prior to running coconet.) No command line switches are required, but to find what is available, run coconet with the switch help (ie - "coconet help<return>").

5. You should see a screen with palm trees and an ocean view. Find the menu at the bottom. Under "Settings", chose the correct settings of your system (e.g. - 2400 baud; 8,N,1; select COM 2 if you are using a serial mouse on COM 1).

To access NEWTON:

6. Chose the "connect" menu bar and then "direct dial". Test that the modem is connected properly by typing "AT<return>". The modem should respond by putting the word "OK" on the screen. If this does not appear, check your connections, that the modem is on, and that your "Settings" are correct. If this appears, you are ready to dial NEWTON. Do this by typing "atdt252-8241<return>" (add 1708 if not in 708 region). You should start hearing dialing sounds. "CONNECT" will appear when you connect. If this does not appear, press <return> to get it to appear.

7. You are now ready to proceed as described in the "First Call (Login)". Please note that since you are using the coconet access program instead of a text mode emulator, you must login as "coconet" not "bbs".

Additional Access Program Information:

You are now ready to browse NEWTON! Notice the left mouse button zooms you deeper into the menu system while the right button zooms you back out. There are many neat things you can add to your email and discussion notes right before you send them (see "include"). You can save notes & email on your hard drive with ease (see "files"). There are two draw backs to this software 1) the user CANNOT portal to other Internet sites (NASA Spacelink or the Weather Underground) you must access them via text mode with typical communications software, 2) this software only works with hosts that use Coconut software.

FIRST CALL (LOGIN)

Assuming that you have the necessary hardware and software, have everything connected, and have read through your communications software manual, you're ready to connect with NEWTON, Argonne's BBS. Start your software, set your baud rate to the highest rate possible and software to 8/N/1 (that is, 8-data bits, no parity, 1 stop bit), and enter the Argonne BBS telephone number (708-252-8241). If the phone line you are using has call waiting, it can severely interfere with your connection. Most areas that have call waiting have the ability to turn it off for a single call or temporary basis. Contact the operator to find the exact code in your area. The code (i.e., *70) is entered before dialing the number to be called. Using the example code, if you had call waiting and live in the 708 area code, you would dial *70, 252-8241. (**NOTE**: Include the comma if your software is dialing the phone; it causes the modem to pause for two seconds.)

Now dial the number. When your computer connects with Argonne's BBS, you might hear a series of high-pitched sounds on your speaker. It's OK; the computers are just "handshaking" to determine the speed at which to talk.

To use the BBS login as 'bbs'
('enter' as password)

login: ***bbs***

Figure 1

NOTE: In the following text, several conventions are used:

1) Quotes are used to surround text that should be typed. For example, type "hello" means to actually type the characters h e l l o.
2) The return or enter key is represented by <Return>.
3) The escape or esc key is represented by <ESC>.

Welcome To

the

Argonne National Laboratory
Division of Educational Programs's

NEWTON

(An Educational Electronic Bulletin Board System)

WELCOME!
Argonne National Laboratory BBS

[[Welcome! Choose an option:]]

1. Specify your signon name
2. Disconnect from system now <ESC>

Select an item from the menu > ***1***

Figure 2

While the computers are exchanging signals, your software might alert you by printing the message "carrier detect" or "connected." You should now have a blank screen with the cursor (blinking) in the upper left-hand corner. If you do not get a prompt saying 'login: ' as in Figure 1 above, hit the <RETURN> key and NEWTON will spring to life.

In lower case, type in the word "bbs"; then press <RETURN>. **NOTE**: You MUST type in the full word "bbs" to enter the BBS (or "coconet" if using the access program; see the section "Getting to NEWTON"). You will get a welcome screen similiar to Figure 2.

Select item 1 from the menu by typing "1", and then press <RETURN>. You are then asked to type your signon or "new" to register (Figure 3).

Type "new", and then press <RETURN> to register if you are a new user. (If you are not a new user, enter your signon name and password, and proceed to the "Features" section of this manual.) You are then told you will be required to fill out certain information and asked whether you would like to continue.

Type "c", and then press <RETURN> to continue (Figure 3).

```
Please type your signon name, or 'new' to register > new

[[ New User Registration ]]

You will be asked for your first, middle, and last names.
You'll also be asked to enter a mailing address and telephone.
If you do not wish to register now, please sign off now.

Type 'c' to continue, or 'q' to quit and sign off > c
```

Figure 3

Next, you tell NEWTON what text mode you will use (Figure 4). Type "1" and then <RETURN>, to use plain ASCII text. If you would like to use DEC VT-100, you must consult your software manual to see whether it allows for VT100 terminal emulation and how to set it up (refer to the "Setup" section in this manual). Now you're ready for registration. The process is straightforward: you will be asked a series of questions (Figure 4).

```
When you access this system in non-graphics mode,
the system can use either plain ASCII text, or it
can work in a VT-100 compatible text mode if your
telecom software supports VT100.

Please indicate below which text mode you would like to use:

  1) Plain ASCII text
  2) DEC VT-100 emulation

  > 1


NOTE: At any prompt you can press ESC to cancel registration.

                          FIRST name> John
                         MIDDLE name > Smith
                           LAST name > Doe
                           JOB TITLE > Teacher
                            COMPANY > Your School Name
                             STREET > Mail Address
                               CITY > City of School
                      ZIP/POSTALCODE > Zip for School
      DAYTIME/WORK PHONE NUMBER > School Phone
      EVENING/HOME PHONE NUMBER > School/Home

Now create a password.  Remember, passwords are case-sensitive.
Passwords may have up to 15 chars.

|--------------|
>*****
Type again:

|--------------|
>*****
```

Figure 4

Please answer all of them! The information is kept private to other users unless you change the status after you are logged on. If this information is not entered correctly and completely, your account could be denied now or any time in the future. The information is used to verify users and to ensure that users are accountable for their actions. Many systems will immediately deny access if it is not entered fully and completely.

When you create your password, remember it is case sensitive and that it can be any combination of letters and numbers, upper and lower case. The computer will print "*" for each character. This is for security reasons; it will happen each time you enter your password. The "*" instead of the letters you type prevents someone else in the room from "stealing" your password. The program will ask you to enter your new password twice, just to verify it. It is possible to change your password at a later date, and it is highly recommended that you do so periodically.

The system creates a signon name for you and displays it (Figure 5). You must remember this because you will need this each time you login. The name will alway be in lowercase and can include spaces.

Please wait while your user records are created...

Your signon name on this system is: 'my signon name'
Please note how it is spelled.
Each time you sign on to this system,
you'll need to use this exact spelling.

Press RETURN to continue.

Figure 5

Write your password and username (signon) somewhere. Remember: your password is case sensitive, so write it exactly. NEWTON will process your registration and make sure there are no username conflicts. If everything is OK, you will see a "welcome" screen like the one in Figure 6.

At this point, you are a registered NEWTON user. Each time you connect in the future, you need only to login as "bbs" (Figure 1), indicate that you wish to specify your signon name (Figure 2), and enter your signon name, instead of "new" (top of Figure 3), and password.

At the welcome screen, choose "1" and press <RETURN>. Then signon with your new login name. You will then need to enter your password. After entering your password, you are connected and on-line.

WELCOME!
Argonne National Laboratory BBS

[[Welcome! Choose an option:]]

1. Proceed to sign on as 'my signon name'
2. Sign on as someone else
3. Disconnect from system now <ESC>

Select an item from the menu > *1*

Press ESC to cancel, or type in password > *****

Figure 6

[[Main Menu]]
Argonne National Laboratory BBS

The main areas of the board are as follows:
A) '1) System' '2) Directory of Users' - Lists all users of the BBS,
B) '1) System' '3) List Users' - Lists all users currently on line,
C) '2) Personal' '7) Mail' - Send/Receive mail to/from other users,
D) '3) Group' '1) File Exchange' - General upload/download file area,
E) '3) Group' '3) Discussion' - This is the same as '4) Features' but
with many more options. This is the major focus of the board.

THE ONLY WAY THIS BOARD WILL WORK IS FOR YOU TO LEAVE INFORMATION! Upload files, LEAVE memos in the GROUP DISCUSSIONS, and SEND PERSONAL MAIL to other users! SHARE YOUR KNOWLEDGE WITH OTHERS: that is what this is about, it is not a one-way street!
This BBS is dedicated for educational use. It is open to all teachers and students of any age. Foul or inappropiate material will not be tolerated. Any abuse of this will result in the dismissal from this BBS.

UNDER NO CIRCUMSTANCE is copying or pirating commercial software permitted.

1) System 2) Personal 3) Group 4) TeachingTopics 5) SignOff >

Figure 7

You will be greeted with the opening screen or main menu screen (Figure 7). The message at the top of the screen changes from time to time, but the menus at the bottom are the main menu choices.

NEWTON'S FEATURES

Main Menu

1) System 2) Personal 3) Group 4) TeachingTopics 5) signoff

System

1) System

1. About this BBS....

This is a statement describing the bulletin board, its operators, and its purpose.

1) System

2. Directory of Users

This selection lists all of the users of the BBS. It lists their names and login names. It is also possible to search the database of users for a particular user, change your user information, and specify what information other users can see about you.

1) System

3. List of Users

This function lists all the users (signon names) who are currently on-line.

Personal

2) Personal

1. Preferences

This sets a number of preferences for your account. They include the terminal type you are using, wether you want others to be able to chat with you, and the size of your screen.

2) Personal

2. Password

This option is used to change your password.

2) Personal

3. Information

This is used to get information on your account. The information includes (1) how many times you have logged on, (2) total hours on the BBS, and (3) upload/download ratios.

2) Personal

4. Chat

This allows any two users who are on-line simultaneously to have a one-on-one private conversation. When you choose this option, you are asked the account with whom you would like to chat. The person must be currently on-line. To find out who is currently on-line, use "1) System", "3. List of Users." The person must also have his status set to "available." To change your status, use "2) Personal", "1. Preferences", "3. Set chat status."

2) Personal

5. Log

This feature lists all files and mail sent to and from your account.

2) Personal

6. Files

This is a private file area where you can upload and download files. These files are stored in your own personal space and are not viewed by everyone like in the Group File area.

2) Personal

7. Mail

This is a person-to-person mail coorespondence. The feature allows you to send and receive mail with other users on the system. If you see a message on the main menu that says "Mail", then you have a new message here.

Group

3) Group

1. File Exchange

The group file exchange area is the location of files that are available to all users that have permission for that area. For example, any user may log on and download the coconet access program (CAP) from this area. Some area are restricted (e.g. - downloads only) while other areas are not (e.g. - uploads and downloads). NOTE: You should, when uploading files, be descriptive in naming and describing the files that are put here. NO COMMERCIAL SOFTWARE IS ALLOWED - VIOLATORS WILL BE PROSECUTED.

3) Group

2. Meetings

This option is available only to those users who are using the coconet access program. It is similar to "2) Personal", "4. Chat", except that it occurs between multiple (not just two) users.

3) Group

3. Discussions

This is the most active area of the BBS. This is the group 'forum' or discussion area. Notes posted here are viewable by all BBS users. There are many different discussion each with a sub-set of topics. The choices range from hobbies to Ask A Scientist. Each discussion has a topic called 'ABOUT'. This topic lists who the moderator of the forum is and what the forum is about. NOTE: There is a special feature in this section called 'See list of ACTIVE Discussions'. When selected, this feature prompts for a date and lists all the notes that have been added or responded to on or since that date. This option is useful for scanning for the most recent notes in a topic.

Appendix A. Hardware/Software Purchasing

Background

When purchasing a modem, you should consider two major items: (1) hardware and (2) software. The hardware is composed of the modem and the interface (usually a port on the back of the computer and a cable). The software consists of a communications package that has file transfer protocols and terminal emulations.

In order for modems to work or "talk" with each other over phone lines, standards must exist not only between each modem, but between the modem and the phone service. There are two major standards. The first is Microcom Network Protocol (**MNP**) standards. These standards are developed by the Microcom Corporation and licensed to manufacturers. The second is International Consultative Committee on Telephone and Telegraph (**CCITT**), who set the V.xx standards, where the xx is the number of the standard (the letters "bis" can also follow the numbers, which is French for revision.).

The standards for the modulation of the signal over the phone lines and how the modems interpret the signals are listed below. All modems must conform to one of these standards.

1) Bell 103/113 - Standard for 300 bits per second (bps) full-duplex transmission.
2) Bell 212 - Standard for 1,200 bps full-duplex transmission.
3) V.21 - Standard for up to 300 bps full-duplex transmission. Also used in Group 3 fax transmission.
4) V.22 - Standard for 600-1200 bps half-duplex transmission.
5) V.22bis - Standard for 1200-2400 bps full-duplex transmission with backward compatibility for V.22.
6) V.32 - Standard for 4800-9600 bps full-duplex transmission.
7) V.32bis - Extension of V.32 to include 7,200, 12,000, and 14,400 bps.

Hardware

The major considerations in hardware are as follows:

1. **Hayes Compatibility.** A modem is connected to the computer via the interface (cable and serial port), and then the modem is connected to the phone line. To dial the phone, answer the phone, and set up the modem, the computer must be able to talk to the modem instead of passing those characters over the phone. In order to do this, special character commands are sent. When the modem detects these commands, it interprets them and does the corresponding function. These commands can vary from one modem manufacturer to another. But with time, a standard has evolved called the Hayes Standard AT Command Set or the Hayes AT set. In order to be sure that a modem will work with all the common software and hardware available, the modem should have Hayes compatibility.

2. **Baud.** Baud is a an outdated term but is commonly used to refer the rate at which data is sent

over the phone. The true meaning is the number of signal level changes per second. Initially, this was strictly on or off, so bits per second and baud were used interchangeability. In newer modems, there can be multiple signal levels, so a new term, symbols per second, is used. For example, if a V.22bis modem transmits only 300 symbols per second but there are 4 different signal levels, it has a transmission rate of 2,400 bits per second (bps). Since baud is commonly used to represent the rate (in this case bps), baud will be used in the following text to represent the rate of transmission.

The current possible rates are 1200, 2400, 4800, 9600, 14400, and 19200, with the most common being 2400, and 9600 baud. Almost all modems are backwards compatible. That means that a 9600-baud modem can operate at 2400 baud. The problem with baud is that when two computers connect, the fastest speed that can be used is the fastest speed of the slowest modem. For example, if a 9600-baud modem calls a 2400-baud modem, the fastest speed they can use is 2400 baud. Therefore, it is not reasonable to buy a 14400-baud modem (and pay a high price) if everyone to be called has a 2400-baud modem. Currently, 2400-baud modems are the most popular, with 9600-baud modems growing in popularity.

3. **Error Control.** There are two types of error control: software and hardware. Software can turn the hardware error control on and off, and software error control must be turned off if hardware error control is used. Hardware error control can be used any time while on-line, where software error control is used only during file transfer.

In order for any error control to work, both sides must use the same standard. In software, the standard is selected when you choose the type of transfer protocol (e.g., xmodem). In hardware error control, the two modems must support the standard. Therefore, if the local site has an MNP4 modem, the other site must support MNP4 in order for it to be used. When modems connect, this compatibility is determined at the "handshake." Below are the different standards and their compatibility.

MNP2, MNP3, MNP4 - These are proprietary protocols licensed to other manufacturers by Microcom. Each one is a different level of error checking, with MNP4 being the most recent.

V.42 - This is an international standard and is compatible with MNP2, MNP3, and MNP4.

4. **Compression Protocols**. Compression protocols are used to speed the transfer of data between computers by compressing the data. These protocols work in ways similar to disk file compression programs and actually use some of the same algorithms. Since these compression protocols do the same thing as file compression protocols, they do not speed transmission of files that have already been compressed. Actually, it takes longer to transmit a compressed file using a compression protocol modem. When transmitting compressed files, you should turn off the compression protocol.

The types of file affect the actual level of compression, but high-end throughput improvements can approach four times. Therefore, in some instances, certain files transmitted by a 9600-baud V.42bis compression modem can approach an effective rate of 38,400 bps. A more realistic number of 19,200 bps will probably be seen.

The current standards are as follows:

MNP5 - Another proprietary Microcom standard that is licensed to manufacturers.

V.42bis - An international compression protocol that has higher compression rates than MNP5, and therefore faster speeds.

NOTE: If a modem has MNP5 compression, it has MNP4 error control. If a modem has V.42bis, it has V.42.

5. **Internal/External.** Some types of computer (almost all IBM and compatibles, Apple IIGS, etc.) have what are called expansion slots. This means that additions to the computer can be made on the inside. If the computer has an expansion slot, a modem is probably made to fit in it. It should be noted that other than visible lights on the outside of external modems, the operation and function of internal and external modems are essentially the same. In fact, most manufacturers offer the exact same modem in internal and external models when possible.

Internal modems have the advantage that they are out of sight, not taking up desk space, and have no power and interface cable (other than a phone cable). Since they take their power from the computer, they don't require a power supply as external modems nor do they require a case; thus, they are usually cheaper, sometimes as much as 30% cheaper. But, internal modems must be installed inside the computer. If you are unfamiliar with or hesitant about this process, an external modem should be purchased.

External modems are nice because they can be moved from one computer to another, have external/visible lights to show the status (convenient when setting up the modem), and do not require opening the computer to install. They are usually more expensive and require the purchase of a cable.

6. **Interface.** Modems send and received data serially. This means that one bit is sent, followed by another bit, etc. This process is in contrast to a parallel connection, which sends a set number of bits simultaneously. Therefore, modems connect to your computer via a serial port. Internal modems achieve connection to this port automatically and are set up with software and settings on the modem during installation. No interface cable or external port is needed. When you purchase an external modem, the correct interface cable and a free external port are required. If you do not have a free port, contact your local computer deal for additional parts.

The type of external port connector on the computer varies from computer to computer. An IBM connector is not the same as an Apple connector. But the connection on the modem is usually a 25-pin Sub D female connector. This is a D-shaped connector that has 25 female pin sockets (13 on top and 12 on bottom). Some modems are made for a specific computer type (e.g., a Macintosh SE) and have a cable included. If the modem does not have a cable for the computer included, one must be purchased. If you are unsure of the correct connector, bring the computer manuals with when purchasing the modem or contact a local specialist.

Software

Software is not as complicated as hardware. Usually modems will come packaged with software to use on the computer. This software is usually adequate, but some subtle capabilities might not be offered. In this case or when software is not offered with a modem, purchasing of a separate commercial or shareware software package may be required.

1. **Hardware Compatibility.** Always make sure your software is compatible with the special features of your modem. Some examples are as follows:

1) Hayes AT Command Set - Any package bought should have this capability, but check to be sure.
2) MNP5 and V.42bis support - If your modem has one or both of these capabilities, the software must support it (turn it on and off).
3) Any other special features of your particular modem.

2. **Transfer Protocols.** Transfer protocols are the most important consideration of software. There are many different ways to transfer files. Files cannot be transmitted over the modem the same way that typed characters are. This is because most file contain binary information (a series of on/off bits). Characters are also represented by a series of binary bits, but they are then translated into characters. If a binary file was transmitted, and then translated and saved to a text file, the data would be incorrect. Therefore, the modem must be told that the next set of bits to be sent is special.

This type of transfer is handled by transfer protocols. Many different types have evolved over time. Different protocols are better for files of particular types and size. But some basic protocols are used universally:

ASCII - This is the most basic transfer protocol and works only with text files.
KERMIT - This is the most basic transfer protocol that works on both binary and text files.
XMODEM - There are a few different versions of xmodem available. The standard and most common is XMODEM CRC with 256 byte blocks. It works best with smaller files.
YMODEM - This is a little more advanced and is growing in popularity. It has many different versions, with the most common being YMODEM BATCH with 1-kilobyte blocks. It works best with larger files.

3. **Terminal Emulation.** When two computers connect, except for times during file transfer, the only activity being done is the exchange of characters. The computing power and storage devices locally (disks, etc.) are not used or known by the remote computer. Therefore, each computer must understand (standardize) the way that the keys on the keyboard will work and how the monitor will display that data (for example, how a bold character **h** is displayed and how a carriage return is sent). This process is achieved by terminal emulation.

There are a number of different terminals to emulate. The most common are ANSI, VT100, and VT52. Make sure the package being purchased will emulate ANSI and VT100.

Appendix B. Other Educational BBS's and Services

American Online
8619 Westwood Center Dr.
Vienna, VA 22182
800-827-6364 (Voice)
Monthly/Connect Fees

AT&T Learning Network
AT&T
PO Box 6391
Parsippany, NJ 07054
800-367-7225 ext. 4158
Single Fee

Chicago Free-Net
Chicago, IL
Contact: Paul Bernstein
312-951-8451
Free

Classmate Instruction Prog.
Dialog Information Services
3460 Hillview Ave
PO Box 10010
Palo Alto, CA 94304
800-3-DIALOG (Voice)
Special Fees

CompuServe
PO Box 20212
Columbus, OH 43220
800-848-8199 (Voice)
Monthly Fees

Delphi
1030 Massachusetts Ave.
Cambridge, MA 02138
800-544-4005 (Voice)
Monthly/Connect Fees

Dow Jones News/Retrieval
Dow Jones & Company, Inc.
PO Box 300
Princeton, NJ 08543
609-452-1511 (Voice)
Fees Unknown

FrEd Mail
PO Box 243
Bonita, CA 91902
619-475-4852 (Voice)
Free

GEnie
GE Information Services
PO Box 6403
Rockville, MD 20850
301-340-4000 (Voice)
Signup/Connect Fees

Global Lab -LabNet
Terc
2067 Massachusetts Ave.
Cambridge, MA 02140
617-547-0430 (Voice)
Signup/Connect/Monthly Fees

GTE Education Services Inc.
GTE Place, West Airfield Dr.
PO Box 619810
DFW Airport, TX 75261
800-927-3000 (Voice)
Fees Vary

Iris Inc.
PO Box 29424
Richmond, VA 23229
800-277-0414 (Voice)
Annual/Connect Fees

Learning Link
Learning Link Consortium
1790 Broadway, 16th Floor
New York, NY 10019
212-708-3056 (Voice)
Fees Vary

News Access
Teachable Tech
2179 Hannah Lane
Tucker, GA 30084
404-939-4596 (Voice)
Annual Fee

Nat. Geographic Kids Net.
17th and M Streets, NW
Washington, DC 20036
800-638-4077 (Voice)
Flat Fees

Prodigy
445 Hamilton Ave.
White Plains, NY 10601
914-993-8800 (Voice)
Monthly Fees

TechNet
New York Institute of Tech.
Central Islip Campus
Building 66, Room 205
Central Islip, NY 11722
800-462-9041 (Voice)
Annual/Connect Fees

The Well
27 Gate Five Road, Suite 65G
Sausalito, CA 94965
415-332-4335 (Voice)
Monthly/Connect Fees

Unison Education Network
Unison Telecom Service
4030 Mt. Carmel-Tobasso Rd.
Cincinnati, OH 45255
Signup/Monthly/Connect Fees

XPress XChange
XPress Information Services
Regency Plaza One
4643 S. Ulster St., Suite 340
Denver, CO 80237
303-721-1062 (Voice)
Fees Unknown

Appendix C. Basic Hayes Commands

The modem is an interface between the computer and the phone system. The modem must be configured to be able to "talk" correctly between the two devices. It can be thought of a translator between two different languages. In order to make modems as standardized as possible with all communication software (the part of the computer that controls the modem), the Hayes command set is adopted by most modem manufacturers. A Hayes command starts at the first character of a line and usually (except for A/) starts with AT (this tells the modem "ATtention" or "wake up").

These command are placed in either set-up/initialization strings or dial strings by the communication software. They can also be typed directly to a modem that is in direct-connect mode. In direct-connect mode, type AT <return>; the modem should respond with "OK." Below is a list of basic AT commands and their function.

NOTE: Below, *n* is the parameter value required for the desired effect.

CMD	FUNCTION	PARAMETER
+++	Default escape code	
AT	Attention code	
A/	Repeat previous command Does not require AT before or <return> after.	
A	Enter auto-answer mode	
B*n*	CCITT or Bell protocol	**0** (CCITT mode), **1** (BELL mode)
D...	Dial String	**P** (pulse dial), **T** (touch tone dial), **W** (wait for dial tone), **,** (wait for 2 sec), **@** (wait for quiet answer for 5 sec), **!** (initiate a hook flash), **R** (connect in answer mode) **;** (CMD mode after dialing), **0 - 9** (numbers to dial) ***** (dial * on phone), **#** (dial # on phone)
E*n*	CMD mode echo control	**0** (No echo in command mode), **1** (Echo in command mode)
H*n*	Phone switch control	**0** (ON hook 'hand-up'), **1** (OFF hook 'on-line')
L*n*	Speaker volume control	**0** (Lowest volume), **1** (Low volume) **2** (Medium volume), **3** (Highest volume)
M*n*	Speaker function control	**0** (Speaker always off), **1** (Speaker on until connect) **2** (Speaker always on), **3** (Speaker on only during connect)
Q*n*	Result codes	**0** (Result codes sent), **1** (No result codes sent)
S*r*=*n*	Set register *r* to value *n*	
S*r*?	View value in register *r*	
V*n*	Result code response	**0** (Numeric code returned), **1** (English code returned)
X*n*	Normal or extended codes	**0** (Basic set/Blind dialing), **1** (Extended/Blind dialing) **2** (Extended/Dial Tone), **3** (Extended/Blind & Busy) **4** (Extended/Dial Tone, Busy)
Y*n*	Long space disconnect	**0** (Disabled), **1** (Enabled)
&C*n*	DCD (Data Carrier Detect)	**0** (DCD always active), **1** (DCD active during connect)
&D*n*	DTR (Data Terminal Ready)	**0** (DTR always ingnored), **1** (DTR cause return to CMD mode) **2** (DTR disconnects modem), **3** (DTR disconnects & reset)
&F	Fetch factory default config.	
&L	Leased or dial-up line	**0** (Dial-up line), **1** (Leased or 2-wire line)
&S*n*	DSR (Data Set Ready)	**0** (DSR always active), **1** (DSR active during connect)
&W*n*	Write user config. to location *n*	**0** (default used at power up), **1** (use Z1 to retrieve)

GLOSSARY

analog: Signal that varies over time. Telephones currently send and receive analog signals.

ASCII file: Acronym for American Standard Code for Information Interchange. Same as text file. It is the standard for representing each alphanumeric character on a computer.

ACT: Acronym for Argonne Community of Teachers. This is a network of science teachers whose purpose is to interact with other teachers to exchange ideas and teaching materials and to provide support/activities for professional growth.

ASCII protocol: A format for sending text files via telecommunications that does not check for errors in data transmission.

auto-dial: A feature of communications software that allows a phone number to be dialed automatically by the computer.

auto-login: A feature of communications software that logs on to the remote computer automatically. This is usually done in a script file that is written for the procedure.

baud rate: The speed at which two computers send and receive information over communications lines.

binary: Referring to the base number 2 system. A protocol for file transfer usually referring to program file not text (ASCII) file.

bit: An on or off signal in a digital computer. All data is stored as a series of on or off bits in a digital computer.

buffer: A section of computer memory where data can be temporarily stored. In telecommunications software it is commonly called a capture buffer.

bulletin board: A BBS (Bulletin Board System). It is an on-line system that can be used simply to exchange messages or can be a complex interactive data exchange.

byte: A series of 8 bits. In telecommunications, data is sent as a series of bytes via the modem. The byte can have 8 data bits with no parity (8N1), 7 data bits with even parity (7E1), or 7 data bits with odd parity (7O1).

capture: Receive a text file to your computer. Files may be captured to your buffer, disk, desk top, RAM, printer, screen, and several combinations of the above. Software will determine the types of capture available to the user.

capture buffer: Same as buffer.

carrier: A signal of continuous frequency that is supplied by the phone company. The frequency is then modulated by a modem to transmit data.

carrier detect: An indicator built into most modems (a pin or wire on the interface) that tells the computer that the modem is receiving transmitted data from the host (remote) site.

Christensen: A standard data transmission protocol that is used by most systems for file transfer. Usually referred to as Xmodem.

configuration: Setup for your computer, modem, and software to work together. Software will configure the modem interface, slots/ports, speed, buffer, disk locations, and many other parameters.

Connect: Actual connection to the remote computer.

CR: Carriage Return.

CRC: Cyclic Redundancy Check, a check performed on a block of data to determine whether an error has occurred in transmission.

data bits: In communications software, a method used to send your bytes (or characters in a text file). Most host systems use 8 data bits with 1 stop bit. Some sites use 7 bits with 1 stop bit. Configuration is software selectable.

delay: A parameter that sets the time intervals between each block of data sent in a file transfer (upload/download).

demodulation: A change from analog to digital data.

DOE: Acronym for the United States Department of Energy. DOE funds Argonne National Laboratory and other national research laboratories.

download (receive): Receive information from the host computer in file form. The information is sent to some peripheral other than the monitor, usually a disk.

echo: Part of a transmitted signal that returns to the sending location. Characters typed to host are echoed back to computer screen along with host message. In communications software, echo can be set to on/off, host/local, or full/half duplex. The usual setting is off.

emulation: The ability of software to imitate another computer, peripheral, or operating system.

exit: Leave the software program or some aspect of the program.

hang-up: Telecommunications command to hang up the phone, usually software controlled.

host (remote): The computer receiving the telecommunications call (or in other words, the computer answering the phone when modems are used).

interface: A shared boundary between two devices. For example, where the CPU connects to the modem or modem cable.

Internet: A group of speciality computer networks (e.g., ESNet, BITNet, NSFNet, etc.) connected to form a worldwide computer network. Computers on these networks are able to share e-mail and files and even have the capability to login to a local machine and remotely login to a different remote machine.

line feeds: Software-driven carriage return. Some hosts do not send line feeds after a carriage return, and this software option supplies carriage returns. If set incorrectly, there will be blank lines between lines, or all the characters will appear on one line.

log on or logon: Entering necessary information to gain access to the host (remote) computer. Usually includes a user name or number and a password.

Modem: MOdulator-DEModulator. This device must be hooked between the computer and the phone lines. At the local end of the connection, the modem will convert digital computer data to analog data for transmission over the phone lines. At the other end of the connection (remote), it will convert the data back from analog to digital.

modulation: Changing from digital to analog data.

on-line: Telecommunications term for being directly connected to a host (remote) computer.

parity: A bit sent with each byte of data. It is calculated by the local computer and used by the remote computer to determine whether errors occurred in transmission. Most sites do not require any parity setting (in 8N1 the N stands for No Parity). Check site requirements, if required; the setting is software selectable (i.e., 7E1,even or 7O1,odd).

prompt: A symbol or message appearing on the screen asking the user to enter information or take action.

protocol: The set of rules governing the communication between the local and remote computers. Can refer to connection information (e.g., 8N1) or data transfer method (e.g., ymodem). It is software selectable.

receive: The ability to receive (or download) text or binary files from the host (remote) computer to your (local) computer.

redial: Option in telecommunications software that allows for the redial of a phone number when busy signal is detected.

send: The ability to send (or upload) text or binary files from your (local) computer to host (remote) computer.

settings: Modifications to the telecommunications protocol settings. They include echo, line feed, speed, parity, and transfer protocol.

slot: The number of the expansion slot that a peripheral is installed in.

speed: The rate at which data is sent from the local to the remote computer, and vice versa. This is measured in baud when using modems.

squeeze: Packing of files, making them smaller, for files transfer. The file would then have to be unpacked (unsqueezed) to be read or used.

sysop: System operator, the person who operates the BBS.

telecommunications: Exchange of data between 2 separate computers, usually over regular telephone lines. Other forms include cellular, satellite transmission, overseas wires, and networks.

text file: Data file composed of alphanumeric characters coded in ASCII format. Files in ASCII text can be read by other computers and programs, where binary files are computer and program dependent.

transfer: Movement of data from one machine to another. This is usually done through an upload or download.

upload: Transfer of a file or program from your (local) computer to the host (remote) computer.

xmodem: A protocol used to transfer files. This is one of the first formats used, and there are many different settings. NEWTON uses the standard that is 256-byte blocks with CRC checking (xmodem-CRC).

ymodem: A protocol used to transfer files. This protocol is faster than xmodem for larger files. There are many different types of ymodem. NEWTON uses the standard for ymodem-batch that allows for multiple files to be transferred at once and has 1-kilobyte blocks.